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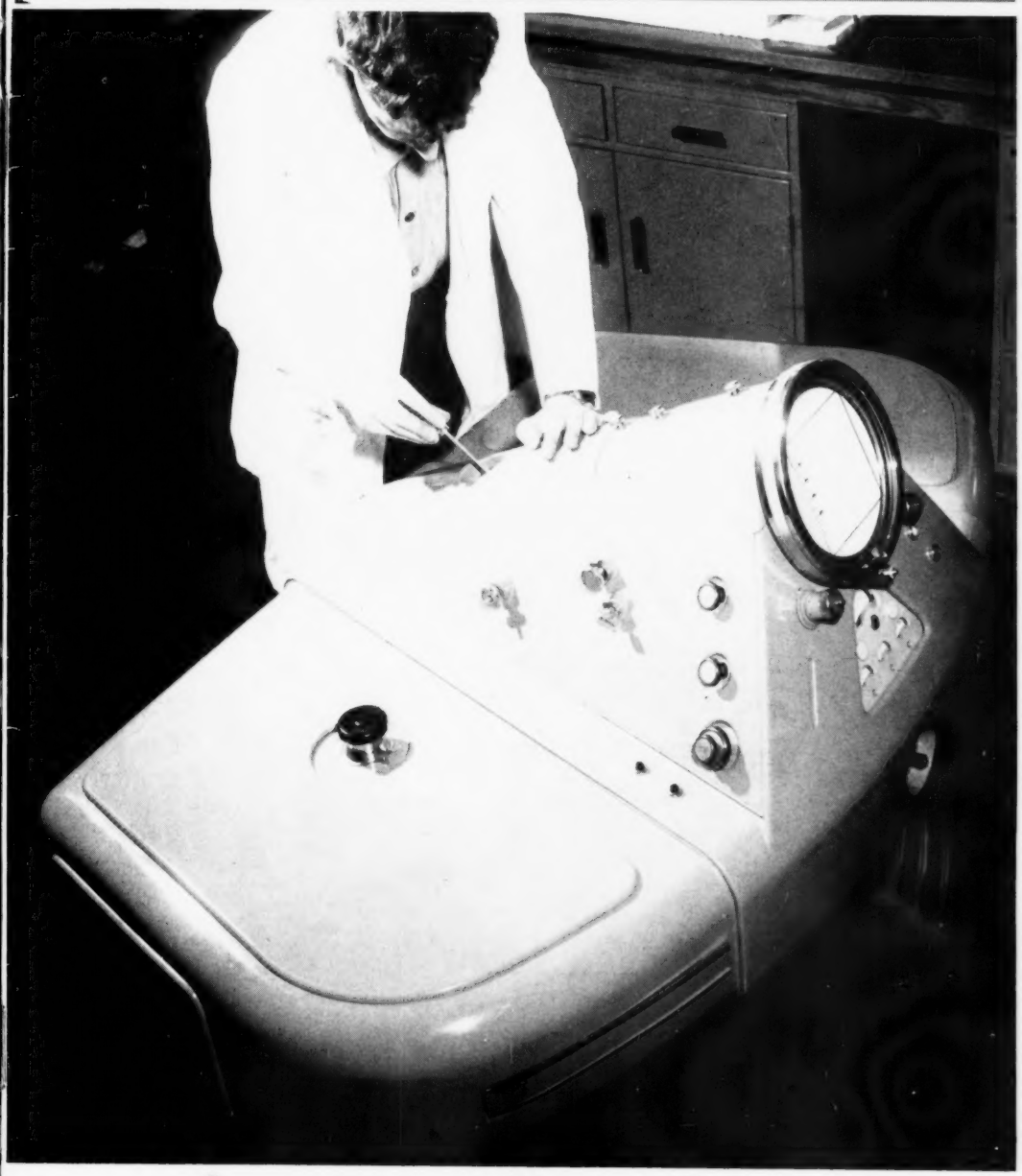

Topics

INDUSTRIAL NURSING

HEALTH HAZARDS and INJURIES

Occupational Health Division

DEPARTMENT OF NATIONAL HEALTH AND WELFARE, OTTAWA

Occupational Health Review

Volume 8, Number 3, October 1956

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COVER PLATE

The piece of equipment shown in the cover photograph is the Occupational Health Division's Electron Microscope.

This instrument is one of the most modern scientific tools available for the study of industrial dusts. It permits examination of very fine dusts which are evolved from many industrial operations, and which, if inhaled in sufficent quantities, may lead in some instance to lung disease.

The service of this instrument is available for health departments across Canada in their programs for reduction of ill-health in the dusty trades.

* THE DEMANDS AND SCOPE OF INDUSTRIAL NURSING

By Margaret M. Wheeler, R.N.
Nursing Consultant, Division of Industrial Hygiene, Ministry of Health for Quebec, Montreal, P.Q.

Industrial Nursing is the application of the principles of nursing, particularly Public Health Nursing, in business and industry to meet the needs of the worker, by helping him to develop and maintain the highest potential level of health and efficiency through:

Prompt and efficient nursing care of the ill and injured.

Health and safety education.

Co-operation with all plant departments.

Utilization of Community Resources.

These principles are being applied in varying degrees by our nurses, because as I have visited industries throughout our province, I have seen admirable evidence of it. I say varying degrees, because, as we all know, in this field we often have to wait patiently a considerable time to be able to put into practice something we know to be recommended and often necessary; also the extent to which we apply all aspects depends on the needs of the individual industry and group of employees, and the scope which is permitted to the Health Service. However, most industrial nurses seem to have the rare capacity of selling their ideas of improved health services to management, accomplished most often with those qualities of patience and perseverence which are so necessary in industrial nurses.

Today, we hear increasingly the term Occupational Health Nursing in contrast to the familiar term Industrial Nursing. We frequently think of heavy industry when we say industrial nursing, whereas today we find many nurses in light industry. Occupational Health Nursing, then, refers to the application of nursing principles to all employees at their place of work which may be in industry, insurance companies, stores, Civil Service and educational institutions. It also includes agriculture, as in this age of mechanization of farm machinery there are additional accident hazards, as well as toxic chemicals used in pesticides and disinfectants.

The new terminology is now officially used at Federal level in the Occupational Health Division of the Department of National Health and Welfare, and the term was recommended for use by the Canadian Nurses' Association at the Biennial meeting in June 1955. However, at Provincial level, Industrial Hygiene and Industrial Nursing are still used.

Demands of Industrial Nursing:

Industrial nursing demands certain specific professional and personal qualifications. From the professional point of view, the nurse should be a graduate of an accredited school of nursing and hold current registration or license in the province of her employment. It is generally agreed that a minimum of two or three years of general experience is a prerequisite and it would be extremely helpful if this included some experience in social work, psychiatry, public health and out-patient work. Supervisory and administrative ability are very necessary. It is extremely important for the industrial nurse to retain membership and to take an active interest in the activities of her professional organization. On the personal side of qualifications, industrial nursing demands good physical health, as the duties of an industrial nurse are constant and exacting, and we cannot expect to teach the promotion of health effectively if we do not set a good example. Good grooming and neatness are essential. It is very easy for industrial nurses to become lax about their uniforms, working as they are in a non-nursing setting. A nurse should be just as meticulous about her uniform as if she were going on duty in her own training hospital. This means complete uniform, including cap, freshly polished shoes and no jewelry, except class rings, wedding and engagement rings which are usually accepted. Any nurse represents the nursing profession and in like manner the profession will be judged by her. The industrial plant is no place for a nurse who is nervous and not sure of her treatments and methods of procedure to meet every emergency. Many plants have only part-time physicians or one only on call and the nurse often has to assume complete responsibility for making decisions in every type of emergency. She

*Reprinted from the Quebec Bilingual Industrial Nurses Bulletin, May 1956.

also frequently has to be the liaison between the physician and all the levels of personnel. Therefore, it is important for her to be mature and emotionally stable.

The industrial nurse must have an interest in, and an ability to work with, all types of people regardless of race, religion or creed, level of education or work status. The nurse stands between the physician, the employee and the employer; has equal loyality to all three and must be able to inspire their confidence. Her ability to establish good rapport can do much to foster a concept of mutual interest and understanding between management and labor. The nurse of course always maintains a neutral position. She must be flexible. This is a quality about which we see little written, but it is very important. Without any forewarning the industrial nurse must change roles in quick succession throughout her daily work. One visitor to the Health Centre may be the floor cleaner and the next one may be the president of the company. She may be engaged in a counselling interview and be interrupted by an emergency, but she must be able to go back to that interview with no visible evidence of interruption. Each visit is extremely important to the individual, and must be given the attention of which it is worthy. On the heels of an emergency one day, came a girl who was quite evidently upset and incapable of working effectively. Her little dog had been injured the previous evening and she wanted me to give her the name of a veterinary. The previous visitor had no significance for her and had I demonstrated frustration or shrugged off her request with the attitude that it did not come within the scope of the health service, she would have returned to her department a very unhappy person and certainly an ineffective one, to say nothing of the potential accident hazard she would have been.

The industrial nurse must be friendly but dignified and professional. A frequent question from industrial nurses is "What do you do about using first names?" In the field of industrial health, the nurse must use her own judgment and tact. A spirit of camaraderie exists in industry which is seldom found in other fields of nursing but which is acceptable and must be dealt with on an individual basis insofar as we retain dignity and professional integrity. A warm friendly welcome to the Health Centre will do much to encourage the shy employee or introvert to expose a home problem which may be weighing him down and making him an ineffective worker and a potentially ill person. It is important to be able to welcome and care for with equal poise the employee from the boiler room whose clothes are oily and soiled or the president or other executive who is immaculately dressed.

The ability to be a good listener is invaluable. Frequently an employee will reach a solution to his own problem by just being able to think out loud to a sympathetic understanding listener who holds his confidence. There is an excellent elaboration on this theme in an article in the November 1954 issue of the Canadian Nurse entitled "Little Things Mean a Lot".

Since so many plant physicians are on a part-time basis or on call, it frequently devolves upon the nurse to initiate the program which will be developed and to interpret to management the recommended health services. Obviously the availability of the physician affects the degree of responsibility and the kind of service expected of the nurse. Needless to say these demands require initiative and good judgment. An ability to teach is important. Many nurses will probably say — "Oh, I couldn't teach", but they are doing it every day. Most do it on an individual basis but nurses should be prepared to teach in groups, as the nurse is often called on to teach Home Nursing courses or Civil Defence courses.

The industrial nurse needs to have sufficient knowledge of business practice to set up and maintain simple office procedures. She also needs to have an understanding of the value of records and a knowledge of record keeping.

A knowledge of Compensation Laws, preventive medecine measures, community regulations and community health and welfare resources is necessary; also a general knowledge of labor and management regulations and of occupational diseases and hazards, particularly those pertinent to your own industry.

A knowledge of both the English and French languages is usually essential in the Province of Quebec.

Scope

To enlarge on the scope of industrial nursing let us go back to the four avenues for the application of nursing principles in industry, as stated in the definition.

1. Prompt and efficient nursing care of the ill and injured

The original reason for the existence of industrial nurses was to render emergency care to employees injured at their place of work. Today with the emphasis being on the prevention of illness and the promotion of health, emergency care is the minimal service given by the industrial nurse. For this reason many people feel that this aspect should not be placed at the top of the list when referring to the duties or scope of industrial nursing. However, it still deserves first mention because of the very important fact that it pre-supposes medical guidance and standing orders. It is an accepted principle that nurses work under the direction of a practising physician. In industry, we find physicians working on a full-time, part-time or on-call basis. The nurse should have the guidance of written standing procedures, signed by the plant physician, regardless of the proportion of time he spends within the actual plant. If, however, the nurse is working without any medical guidance, she may secure written standard procedures through the Industrial Committee of the Provincial Medical Association or Canadian Medical Association; or through the Division of Industrial Hygiene in her province.

The extent of nursing care is, of course, dependent on company policy and the amount of medical guidance. Where there is a full-time physician, the nurse's responsibility is usually limited to assisting him, or to the care of workers not needing his attention. Written procedures outline this. Where a physician is on a part-time or on-call basis, the nurse sees all workers and must exercise good judgment relative to the need for medical treatment. It is extremely important that the industrial nurse be constantly cautious that she never practises medicine.

2. Health and Safety Education

In the field of industrial health, the opportunities for health and safety education are unlimited. These start with the first interview when taking the history. This is an important time to inspire the confidence of the worker by interpreting the value of the physical examination, the value and use of the health service, and the safety measures existent in the plant.

Every visit to the Health Centre is a potential opportunity for health education. While dressing a minor wound the nurse might inquire about the follow-up on a physical defect, such as decayed teeth, which was no doubt pointed out at the time of the physical examination. What better time is there to teach nutrition than when an employee comes about ten A.M. with a headache, after having had no breakfast?

The minor injury is very fertile ground on which to interpret safer working habits. Intelligent questioning of every injury, no matter how slight is an excellent teaching aid. It is recommended that the nurse visit the plant regularly and become familiar with all hazards. During such visits she can do much to assist in encouraging employment to wear safety equipment according to company policy.

When we speak of health promotion and health education, we refer to health in all its aspects — physical, mental and emotional. The industrial nurse has unique opportunities to promote good mental health. Employees frequently have marital, religious, economic and other home problems and wish to discuss them with the nurse. This is where the nurse's ability to be a good listener is invaluable and she should be prepared to give guidance in helping an employee to a solution of his problem.

Bulletin boards and pamphlet racks are an excellent means of promoting health and safety education. The material displayed in this way should be changed frequently and should cover general health topics which relate to all members of the family unit.

The industrial nurse should take advantage of every opportunity to speak to employee groups. There are many films and film-strips available which make excellent teaching aids. Short ones might occasionally be used in rest period time or during the lunch period.

Records are a vital part of any health service. The minimum records recommended for an industrial health service are a daily log and a record for each visit, no matter how slight the treatment may be. A complete record for an employee who may be a frequent visitor, can be valuable to the physician in pointing up an underlying condition such as gastric ulcer or brain tumor; it may point to a home problem or an imagined or real grievance in relation to work. Absentee records, Workmen's Compensation records and monthly and annual reports to management are very important.

Since plant sanitation directly affects the health and morals of the worker, the nurse also assists with this part of the plant program. She should be familiar with regulations regarding ventilation, illumination, cleanliness, eating facilities, wash and change rooms and toilet facilities. It is generally recommended that the nurse be asked to make routine inspections of these facilities.

Home visiting is an excellent avenue for health promotion. It contributes greatly to the morale of the employees and has been found to help reduce absenteeism. A word of caution here — nurses should never do policing, and it is their responsibility to interpret this to management.

3. Cooperation with all plant departments

The nurse is the pivot of the health service, and indeed is frequently the pivot of her industry. To fulfill this role, the basic requisite is her ability to establish good rapport with all levels of the personnel. It is extremely important to enlist the support and co-operation of the foreman of each department as his constant contact with his employees makes him a very effective liaison between the nurse and the employee. His daily observation of employees may often enable him to detect an individual who appears to be deviating from the normal; if he has confidence in the nurse he will route this individual to her, who may in turn feel that referral to the physician is necessary: thus a potential illness or accident may be prevented.

The nurse is frequently requested by the physician to be the liaison between the plant physician and management. As such, she should be able to present requests to management in an understandable manner, using non-technical terminology and she should be able to sum up recommendations in terms of man power and/or money.

Participation in plant welfare activities is an important role for the nurse; this includes insurance programs and the safety program. If no such schemes exist the nurse may be instrumental in promoting the idea. It is recommended that the nurse be a member of the safety committee. Welfare activities would also include vigilance over the cafeteria services and facilities.

In her close contact with employees and her ability to be a good listener, the nurse is very frequently exposed to complaints about working conditions, the supervisor or fellow-workers. It is imperative in such instances that she exercise tact and good judgment in determining whether such complaints are deserving of referral to the supervisor, the personnel department or higher management. Very often just the listening is sufficient, but it rests with the nurse to discriminate between what is real and what is imagined.

4. Utilization of Community Resources

Industrial Health services essentially reach the breadwinner at his place of work, but they also reach into the home through the employee himself asking for guidance regarding a home problem, or through home visiting. Therefore, it is essential that the industrial nurse be familiar with the community health and welfare resources in her area and the area where the workers live. It is important to avoid duplication of service but at the same time it is the nurse's responsibility to co-ordinate her services with the other health and welfare services of the community in the best interest of the employee and their families.

It is recommended that industrial nurses keep a list of the physicians in the area plus a list of the major health and welfare resources. Some nurses keep a list of the family physician of each employee.

Industrial nursing cannot be divorced from public health nursing. We are all working in one field — HEALTH, towards one goal — OPTIMUM HEALTH FOR ALL, but we work with varying emphasis — in our field it is at the place of work — INDUSTRIAL OR OCCUPATIONAL HEALTH NURSING.

EVALUATION OF AN INDUSTRIAL NURSING SERVICE

Miss Margaret I. Hardy, R.N., Nursing Consultant,
Division of Industrial Hygiene, Dept. of Health, Toronto, Ont.

Nursing service is a part of the health service in industry and as such it cannot be divorced from the complete program. We will, however, consider the nursing area only.

Evaluation is a common every-day activity. Self-evaluation ranges from a glance at your lipstick to a searching self-analysis when you are faced with a serious problem. Evaluation of others has the same wide range—from the lazy appraisal of a passenger on a bus to the analysis of a psychiatrist.

Evaluation of work is characterized by purpose, which we identify as an objective, and by standards, which are measures or models to which our work should conform. In order to find out if we are reaching our objective, we compare the work actually done with the standards set up.

Let us begin by asking a question. How can we objectively evaluate this nursing service that is a part of an industrial health program? This sounds like a simple question which can be answered by a few statements. Please do not be misled! It involves an analysis of the objective, the standards, the records and the reports. These statements have to be defined for every phase of the service and for every activity of the nursing staff.

I What are some of these activities?

1. *Treatment technique.*
   - Is the technique aseptic?
   - Is it surgically clean?
   - Is it executed efficiently with care and consideration for the patient?
   - How would you enumerate the various steps that make up a treatment technique?

2. *Interpersonal relationships.*
   - How does the nurse meet the employee?
   - Is her attitude friendly, interested and helpful?
   - How should the nurse meet employees?
   - What should her attitude be?

3. *Counselling and guidance of the employee.*
   - Is this service offered?
   - If not, why not?
   - Is the nurse a good listener?
   - Does she have problems of her own that she cannot resolve?
   - What are her limitations?
   - Does the nurse know and appreciate her own limitations?
   - Are local social and health agencies used?

4. *Health teaching.*
   - Does the nurse recognize every teaching opportunity?
   - Does she consider every contact a teaching opportunity?
   - Is there time for teaching?
   - Is the nurse's time used to advantage as far as health teaching is concerned?

5. *The manual of policies and procedures.*
   - Should there be such a manual?
   - Is there such a manual?
   - What does it contain?
   - Is it up to date?
   - How is it set up?

6. *The regular plant tour.*
   - Does the nurse go into the plant?
   - Should she visit the various departments regularly?
   - Can she visit a few departments or the whole plant on a tour?
   - Should she visit daily, weekly or monthly?
   - How does she use this tour?
   - Is it a learning experience for herself?
   - Is it a teaching opportunity for casual contacts?

Among other activities are home visits, records, educational opportunities, interdepartment relationships and community agencies. Every one of these aspects of the industrial nurse's work can be broken down into units, which must be linked with standards of conduct.

II How can these activities be rated?

The effectiveness of the industrial nursing service is demonstrated by the response of the plant population.

1. Does management show its appreciation through interest, cooperation and support?

To what degree does it support the program?

2. Do employees use the services for non-occupational problems as well as for occupational conditions.

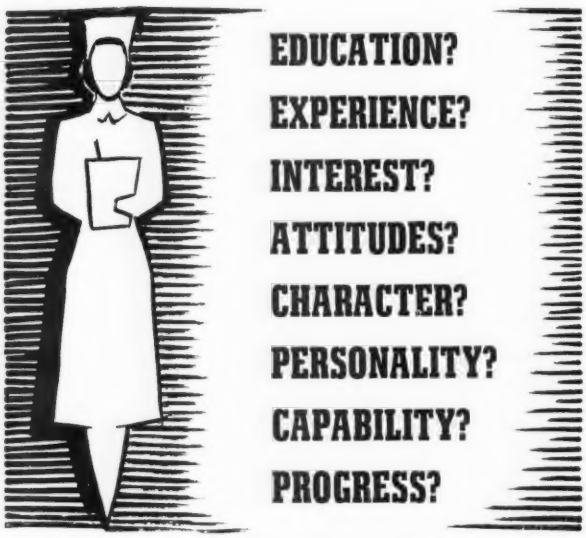
Do they come to the health centre as a last resort?
Do they come early for advice?

3. Does the staff co-operate fully?
Does the medical director support the nurse?
How do the nurse and the safety man get along?
How do the nurses get along with each other?

III How can the nurse be evaluated?

A great deal has been written about the personal and professional qualifications of an industrial nurse. Qualifications are important but in order to evaluate a nursing service one must consider the nurse in action. As the quality and effectiveness of an industrial nursing service is entirely dependent upon the nursing personnel, this is the most important and hence the most difficult area to evaluate.

What is her preparation?
What experience has she had?
What is expected from
(a) a new graduate
(b) a nurse with no public health training or experience



(c) a nursing with public health training but no experience
(d) a nurse with public health training and with experience in community health work.

Is she interested in her job?
How does she show interest in her job?

Does she participate in the activities of her profession?

Are her attitudes acceptable?
What is meant by acceptable attitudes?
How long has she been with the Company?

Has the nursing service improved since she joined the company?

If she is a supervisor does she promote staff education and development?

IV How is an evaluation of the industrial nursing service made?

Evaluation is based to a large extent on observation. Any observation is an interpretation, and as such reflects the personality, experience and philosophy of the person who makes it.

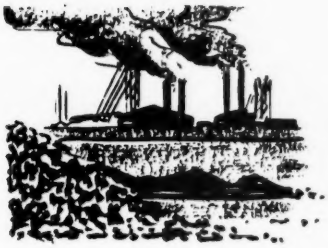
No industrial nursing situation is so simple that its definition does not require selection from the many things observed. This is a tremendous undertaking. To effectively and objectively evaluate an industrial nursing service, or any phase of it, requires a great deal of knowledge and research plus the ability to define objectives and standards clearly and concisely. The three steps enumerated are frequently presented as an acceptable pattern:

1. Define the objective (purpose) of the service or activity. Formulate a clear statement of the objective in terms as specific as possible.
2. Select standards that are related to the service or activity. Define them clearly, concisely and specifically in terms of the purpose.
3. Analyze the service or activity and its related data. This can range from a simple comparison of two sets of related statistics to a detailed analytical procedure for organizing data.

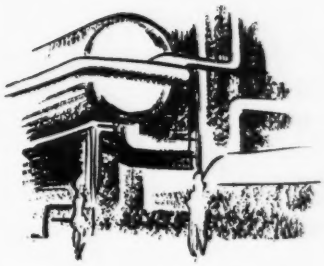
V Who can evaluate?

1. The nurse can evaluate herself, her activities or service, provided she can be objective (stand back and look at herself) in her approach. It is easy to rationalize but very difficult to survey, appraise and compare anything in which we are intimately involved.
2. The nurse consultant can be of particular value in this area of evaluation. She is not emotionally involved; moreover, she has qualifications with broad experience in the industrial, the public health and the hospital nursing fields as well as in nursing education. She sees the broad picture, and is aware of new trends, which she can share. A consultant, so equipped, is ready to assist in the evaluation of a specific area or of the total industrial nursing service.

One of the most important purposes of evaluation is its contribution to the professional growth of the nurse. Evaluation becomes an instrument of growth only as the nurse whose service is being evaluated participates in the process. Its real value lies in the growing ability of the individual to see some of her own needs as she progresses towards an ever-broadening goal. It enables the nurse to know that she needs to move forward; it enables her to extend her aims as she moves along. Good evaluation is made by or with, not to or for, people. It should, therefore, be a growing process for the evaluator as well as for the one evaluated. Because the industrial nursing service is completely dependent upon its personnel, evaluation is essential to its growth and its increasing success.



* HEALTH HAZARDS IN THE COAL AND CHEMICAL INDUSTRIES



A summary of Proceedings of the First Provincial Meeting of the British Occupational Hygiene Society.

The First Provincial Meeting of the British Occupational Hygiene Society was held at University Hall, Liverpool, in April 1956. In his Presidential Address Dr. C. G. Warner, Dust Suppression Scientist of the South Western Division of the National Coal Board, spoke of the satisfactory progress of the Society, an indication that by practical activities it was fulfilling its aim of promoting the science of occupational hygiene.

Dr. Warner went on to talk about the remarkably changed situation regarding pneumoconiosis in coal mines which had been occasioned on the one hand by increased awareness of the disease, and on the other by measures taken for suppressing airborne dust.

South Wales had formerly been a bad area and after 1943, when the legal definition of pneumoconiosis was relaxed, the rate of certification rose to a peak figure of 55.6 men per thousand employed; by 1947 it had fallen to 30.8. Meanwhile, in the rest of the country the corresponding figure for 1947 was only 1.9 men certified per 1,000.

As knowledge of pneumoconiosis spread outwards from the Welsh pits the number of cases in other parts of Britain rose from 597 in 1945 to 3,542 in 1954. The rapid improvement in dust control had its effect, however, and the number of cases in South Wales fell from 5,224 in 1945 to 927 in 1954.

Many years elapse before the disease can be detected in a coal miner, even when he is working under dusty conditions, and present victims accumulated most of the dust load in their lungs some time ago. Such conditions are practically eliminated and it is expected that in 20 years' time only the mildest type of pneumoconiosis will continue to be encountered.

The first paper was read by Mr. H. Pirie, of the Technical Service Department, Imperial Chemical Industries Ltd., General Chemicals Division. His title was "Chlorine—Production and Uses".

Chlorine was formerly transported as bleaching powder, but, since its use as a war gas in 1915, it had been transported as liquid and many tens of thousands of tons a year were now transported in tanks, drums and cylinders.

Many users, such as waterworks operators or baths superintendents, had no technical experience, and rules had been devised for their protection.

The important points were:—

(1) Liquid chlorine must be dry and the packages and valves foolproof. Filling ratios must be observed and containers serviced and tested regularly.

(2) The customer should know how to use the product and to handle the packages safely. His drum and tank installations required initial inspection and instruction and precaution cards were issued.

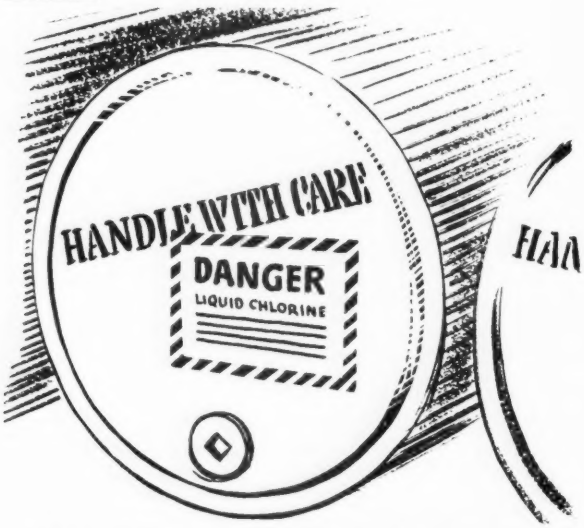
(3) The customer should know what to do in the event of an accident. A Chlorine Emergency Service was available to deal rapidly with trouble at the premises of any user.

(4) Regular visits to the customer were made to ensure that the necessary precautions were being taken.

Trichloroethylene was one of the oldest of the commercially available organic compounds of chlorine and the one made on the largest scale. It was less dangerous than many others because it had no chronic effect. It had many uses in industry and could be used safely provided simple precautions were taken.

*This summary was prepared and submitted by Mr. C. N. Davies, Honorary Editor of the British Occupational Hygiene Society.

Mr. Pirie also referred to the system of labels for hazardous products devised by the Association of British Chemical Manufacturers. These were intended to protect the transporters of such substances—railway employees, lorry drivers, storekeepers, etc. They were distinctly and easily recognizable, named the particular hazard, described its nature and gave simple precautions to be observed in case of spillage, fire or other accident.



The next paper, "The Technique of Particle Measurement in Industrial Hygiene", was delivered by Mr. G. L. Fairs, of the Research Department of the Imperial Chemical Industries Ltd., General Chemicals Division, who described various established methods of taking samples of dust. These included isokenetic sampling downstream of a mixing baffle, sampling in ducts, and the horizontal elutriator, for size separation. Cells for sampling mists containing particles liable to change in size by evaporation or condensation were also mentioned.

Dealing with microscopic analysis of samples, Mr. Fairs stated that below 1 micron it was impossible to differentiate between the images of larger particles and diffraction halos of much smaller ones; the electron microscope should replace the visual instrument for studying fine dusts.

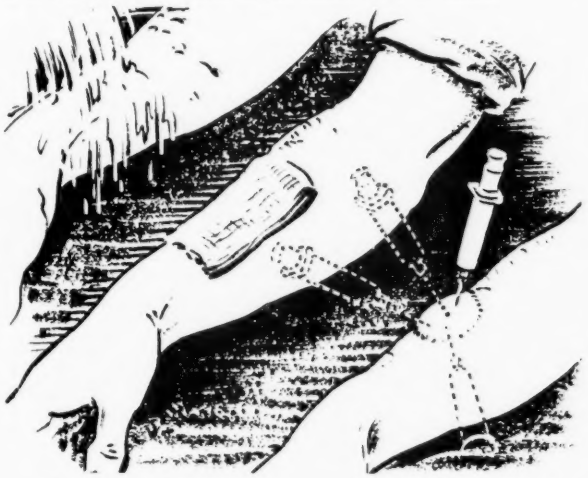
Sedimentation analysis, based on Stokes' law for the rate of fall of particles in liquid, suffered from the disadvantage that samples of the different size fractions remaining in suspension became very attenuated

towards the end of the process and their removal created a disturbance. An apparatus was described which was better in these respects, since it works by flushing out the settled particles for estimation.

Elutriation, by blowing air through a powder to carry away many fine particles which settled slower than the air speed, enabled size fractions to be determined by filtering the effluent and repeating at decreasing rates of flow. It had been found that 30 seconds blowing was often sufficient to give adequate separation with the powder supported on a gauze support in a cylindrical elutriator tube.

The final paper was read by Dr. J. D. Paterson, of the Medical Department, Imperial Chemical Industries Ltd., General Chemicals Division, and dealt with hydrofluoric acid. He said that considering only the acute effects, and ignoring the chronic, this compound must be regarded as even more severe in its action than mustard gas. In designing a plant the possibility of hydrofluoric acid coming into contact with the operators should be reduced to a minimum. In addition, to guard against mischance, adequate protective clothing was

provided, means of decontamination were available, and effective medical supervision was at hand.



The acute hazard was associated with concentrations over 20% which damaged body tissues; acid stronger than 60% caused damage which was immediately apparent. A unique effect with hydrofluoric acid was its power of penetration to a depth where it exerted a dissolving action on cellular membranes, causing liquescent necrosis and decalcification of bone. Pain was very severe and might be immediate or delayed for some hours, according to the strength of the acid. Treatment consisted of washing with copious amounts of water followed by a dressing of magnesium oxide paste. This was usually sufficient for mild burns. Injection of 10% calcium gluconate into and around the burned area until there was weal formation relieved more severe cases very rapidly. Dr. Paterson had not found it necessary to give an anaesthetic before injecting.

Protective clothing required careful inspection. The majority of burns were caused by pinholes in gloves which got hard wear.

The chronic hazard was the possibility of fluorosis, which is a condition of sclerosis of bone and, in extreme cases, ossification of the ligaments. Protective clothing, including a fresh air hood to prevent inhalation of vapour, was an insurance against fluorosis, but a weekly urine test and estimation of fluorine content was established when the hydrofluoric acid plant came into production. The risk of fluorosis was slight when the fluorine was below 10 mg./l. of urine. Their policy was to take 1 mg./l. as a safe excretion rate. It soon became apparent that the excretion rate of fluorine was so high that daily measurements were necessary to detect peaks. After a time these observations provided a valuable indication that all was well with the plant, and enabled small defects, which would otherwise have passed unnoticed, to be rectified.

In spite of all precautions the Medical Department still had to treat an occasional hydrofluoric acid burn, usually due to a faulty glove, but they had never had a serious case, nor a burn of the eye.

Dr. Paterson also referred to chlorine and bromine trifluorides which were very reactive and produced thermal burns in contact with the skin, but did not penetrate in the manner of hydrofluoric acid. The meeting concluded with a film illustrating the work of the Division, and members of the Society were conducted round the Castner-Kellner and Rocksavage works on the following day.

INDUSTRIAL FATALITIES IN CANADA DURING 1955

There was a total of 1341 fatalities reported for the year 1955, an increase of 11 over 1954. The total of fatal and non-fatal injuries reported by Compensation Boards increased from 463,943 in 1954 to 496,639 in 1955.

Fifteen industrial accidents claimed the lives of three or more persons in each case, with a grand total of 63. Seven accidents involving watercraft were responsible for the death of 32 workers; nineteen persons died in plane crashed; a truck and train collision resulted in three deaths; three loggers lost their lives in a forest fire; a cement marquee fell from the third storey and killed three construction workers; and three federal government employees in Ottawa were scalded to death by steam when a connection on a steam boiler broke.

Analysis of accidents by cause shows that 358 resulted from being "struck by tools, machinery, moving vehicles and other objects". Of these, 77 were caused by falling trees; 39 by automobiles and trucks; 32 by objects falling in mines and quarries; 29 by materials falling from stockpiles and loads; and 28, by trains or other railway vehicles.

Accidents that involved "collisions, derailments, wrecks, etc." were responsible for 326 of the industrial fatalities during the year; 132 of these involved automobiles or trucks, 57 involved watercraft and 52 resulted from tractor or loadmobile accidents. "Slips and falls" claimed 243 lives of which 227 were falls to different levels.

Fatalities by Provinces — Ontario had the largest number with 421, an increase of 27 over the previous year. Quebec reported 279 deaths, and British Columbia was third with 251.

By industry, construction accounted for 18.5 per cent (0.5 per cent above 1954), transportation claimed 16.3 per cent (1.4 per cent over 1954), manufacturing had 16.0 per cent (an increase of 0.1 per cent over 1954), and logging was responsible for 13.5 per cent compared with 13.0 per cent in 1954.

*"MINOR" FINGER INJURIES

J. W. McNicholl, M.D., F.R.C.S. (c); O. J. Mirehouse, M.D.
Hamilton General and St. Joseph Hospitals, Hamilton, Ont.

This title was chosen to emphasize by paradox that injuries which interfere with the function of the hand are not minor.

The field of traumatic surgery of the hand is vast and important, so we propose to discuss only one small facet, namely, the potentials and adaptability of the so-called cross finger pedicle procedure in the treatment of soft tissue at the digits.

Iselin in 1946 and many writers since have stressed the importance of these minor finger injuries and have advanced many and varied methods of treatment.

The principal factors to consider are:

1. The very important sensory function of the hand, especially of the thumb, index and middle fingers.

2. The importance of supple fingers of normal length to manual workers.

3. The necessity for good skin cover in relation to both the above factors and especially to avoid the scarred painful finger tips which interfere so grossly with the efficiency of the hand.

Now with these factors in mind, the various methods of treatment should be considered critically.

1. The method of calculated neglect treating the injury with dressings only. These woulds heal slowly by granulations and usually leave a firm, tender, painful, fixed scar.

2. The replacement of the amputated part. This is occasionally successful, but more often the part is never found or is mutilated beyond the point of visibility.

3. Shortening the digit to achieve primary closure of the skin. In rare instances this is the method of choice, but usually, after careful consideration one of the methods of tissue replacement will be found to give a far superior result.

4. Amputation of the digit at the site of election where complicated severe injuries to skin, neurovascular bundles, bones, joints or tendons would preclude return of useful function of the digit.

5. The use of free skin grafts. These grafts are very valuable for *surface replacement only;* but where loss of pulp or subcutaneous tissue is extensive or where tendon or bone are exposed, pedicle coverage is much preferred.

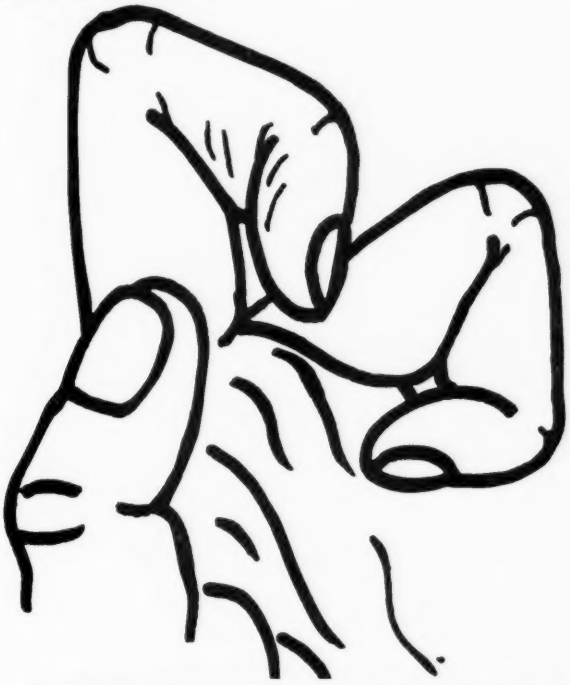
6. The use of local flaps which can occasionally be swung from dorsal to ventral surface of the same finger applying a Thiersch graft to the donor area. The application of this method is quite limited.

7. The use of palmar flaps which are quite widely used and are very useful. However, the presence of a painful, tender scar on the pressure bearing surface of the palm is often a serious disability to a manual worker.

8. Application of pedicle flaps from other areas. Commonly these flaps are taken from the abdominal wall, chest or opposite forearm but the type of skin and

*This paper was presented at the Conference of Ontario and Quebec Industrial Physicians held at Hamilton, Ontario, Sept. 26, 27, 28, 1956.

fat, being so unlike head tissue, and the tremendous problem encountered in fixation and nursing make this method undesirable.



9. The so-called cross-finger pedicle method which is designed to replace the missing portion with a similar type of skin and fat from the hand with a minimum of nursing problem. It is particularly adapted to lesions where bone or tendon are exposed and in the preservation of length of the digit. It is also very useful in the replacement of the bulk of the pulp when this important portion at the finger alone has been extensively damaged.

The disadvantages are:

(a) The need for two operative procedures.

(b) A small percentage, increasing with the age of the patient, may get some stiffness of the fingers because of the fixation but we have found this to be of little or no practical importance.

(c) Anaesthesia of the flap which is relatively minor because it occurs with all other types of surface replacement, and in fact, when sensation returns is much more critical because it is hand tissue with the necessary potential for hand sensation.

The procedure entails the planning of a flap on the dorsum of an adjacent finger so that application to the existing defect can be accomplished easily and fixation maintained with a minimum of effort and a maximum of comfort to the patient.

Because of the excellent blood supply of the finger these flaps can be based proximally, distally, mesially, laterally, mid-dorsally or obliquely almost with impunity. Of course careful gentle technique is essential throughout.

When the finger is extended the knuckle pad over the dorsum of each joint is outlined by an oval of wrinkles. Although in some cases it is necessary, we try not to go closer to the joint than the outermost wrinkle of the oval. When the finger is fully flexed the flexor creases extend onto the medial and lateral aspects of the finger. A line joining the ends of these creases we use as the limits, trying never to extend onto the flexor surface of the finger beyond these lines.

The roughly rectangular area thus outlined is the donor area within the confines of which the flap is most ideally placed. Within these limits, as mentioned before, the flap can be planned with impunity to best suit the situation presenting:

1) For pulp or other flexor surface losses it can be based on either mid-lateral line and unfolded like an open book to be applied to the defect.
2) For guillotine type amputations it can be based distally and lifted like a trap door for application to the end of the injured finger.
3) For thumb tip losses, a flap based on the mid dorsal line and elevated to this point from the mid lateral line allows very comfortable and adequate coverage. Usually here the middle finger is a more appropriate donor because of the importance of the thumb side of the index finger in opposition and grasping.
4) If necessary in dorsal injuries a proximally or distally based flap can be elevated and turned sufficiently to cover an exposed joint.

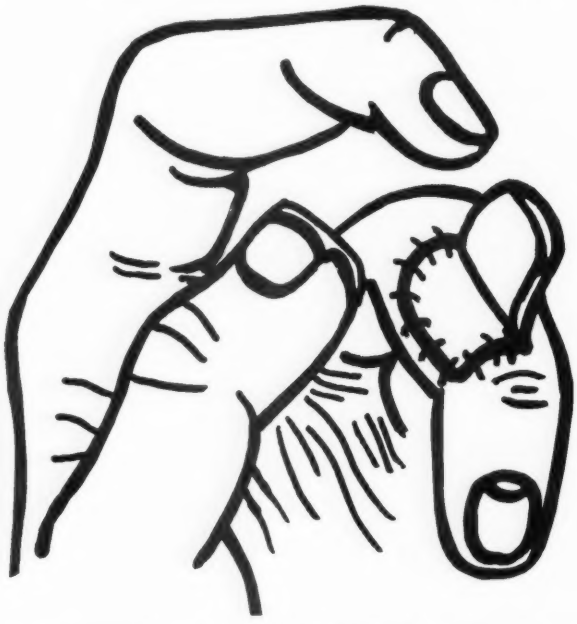
Positioning the fingers is very important for most efficient use of the flap, in relieving tension on the suture lines and for the comfort of the patient. We find that mild flexion of the interophalyngeal joints with variations of the amount of flexion at the meta carpo phalangeal joints gives the best results and leaves very few situations where easy comfortable positions cannot be obtained. Crossing the fingers slightly so that some degree of overlapping is obtained is often a very useful adjunct.

Technique:

The technique we employ entails the use of general anaesthesia mostly for speed and convenience but the use of local or regional blocks is equally applicable.

Avoiding the open wound, the injured extremity is washed, prepared with green soap, ether, iodine and alcohol and draped. The injury is then irrigated with saline and debrided, and hemostasis obtained.

The next step which we consider very important is the creation of a bloodless field for the dissection of the flap. This entails the use of an upper arm tourniquet and an esmarch bandage as used in most extremity operations; or since this is a relatively short operation the use of an esmarch bandage alone will suffice, unwrapping the distal portion to allow access to the operative area; but the former is preferred. This dissection must avoid the neuro-vascular bundles on the sides of the finger and must leave as thick a layer of areolar tissue over the extensor tendon as possible, elevating only fat and skin. After grossly indentifiable vessels are tied the finger is wrapped with moist gauze and held snuggly by the assistant or nurse when the tourniquet is released and while the operator cuts a freehand graft of appropriate size. This can come from the flexor surface of the same forearm or the upper antero-lateral aspect of the adjacent thigh. A moderately thick graft is preferable to minimize contracture on the dorsum of the finger. When this is obtained the finger



is unwrapped, any further hemostasis necessary is obtained, and the graft sutured into the donor defect. Depending on the planning of the flap a small guaze bolus is tied over the graft or a thin layer of gauze is placed over it and the recipient finger brought into position on the guaze. The flap margins are then sutured to the margins of the injury. Zeriform gauze is applied to cover all suture lines and a posterior plaster splint is fashioned to maintain finger position leaving a window over the flap suture line and if possible sufficient access to change the graft dressing without disturbing the finger position. Superimposed over this and incorporating only the involved fingers we use a fluffed gauze dressing. The first dressing is usually done on the fifth postoperative day in the hospital. Occasionally if moisture persists around flap or graft, frequent dressings are necessary, in which case we keep the patient hospitalized. However, we have sent patients home the same day as the operation. We usually see the patient in the office for suture removal at eight to ten days and again just prior to admission to hospital for the second stage which averages sixteen to eighteen days.

The second stage consists of division of the pedicle. Granulations must be trimmed from under the base on the donor finger so that it can be sutured to the edge of the now healed free graft. It is important not to undermine this graft as any undermined portion will be lost. Also the edge of the injury must be freshened and any granulations trimmed so that the edge of the flap can be sutured down with a minimum of undermining to protect its blood supply. The fingers are then dressed individually. Unless unusual conditions exist, the patient is discharged the following day and seen in the office for suture removal at six days. Very small bandages are usually reapplied and gentle active exercise started. On about the tenth day the small bandages are removed and vigorous exercise started so that by about the fourteenth day after the second stage most patients are ready to return to work wearing some form of finger protection. The finger nail, when it regrows, is most often shortened or slightly deformed depending on the type of injury, but to date we have had no serious complications from this source.

INDUSTRIAL LOW BACK PAIN

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To industrial physicians, any accident involving the lumbar or lumbosacral spine is now an intricate problem, as commonly occuring faulty diagnoses result in serious complications for both the injured man and the employer.

Here, an attempt will be made to simplify the problem in order to arrive at an accurate diagnosis and institute adequate treatment.

In serious accidents with simple or compound fractures, diagnosis and treatment present no particular problem. But when dealing with common traumas, all the possibilities must be considered and, therefore, no hasty diagnosis should ever be made.

A definite procedure should be followed in order to ensure a complete and accurate picture of the situation. The following is a suggested procedure:

1. THE QUESTIONNAIRE

All questions must be clear, precise, and presented in such a manner that the injured man fully understands what we wish to know.

(a) How did the accident happen?
(b) Was the patient accustomed to the type of work he was doing? If so, why did trauma occur on this occasion and never before?
(c) Is there a past history of trauma or pathology at the level of the lumbar and lumbosacral spine?
(d) What is the pain like? How severe? Does it radiate? Does coughing accentuate the pain, does it cause it to radiate?
(e) Where is the site of the pain? (The patient it to point it out clearly.)

2. THE EXAMINATION

If the pain is too severe, the patient should be ordered complete rest with sedatives, heat, and antispasmodics, and should not be examined until his condition has improved sufficiently to make complete examination possible. Otherwise, one would be courting errors in diagnosis, which are only too frequent and often result from too hasty and summary examinations.

First, the patient is examined stripped and standing up.

The two antero-superior iliac spines are located with a view to determining whether the equilibrium of the pelvis is normal.

The inspection of both feet is important: are the feet flat, hollow, flexible or rigid? Is there pronation or supination?

A check should also be made for evidence of kyphosis, lordosis or scoliosis.

Does the trunk list to the right or to the left?

Are the paralumbar muscles relaxed or contracted? Does palpation elicit pain? If the answer is yes, are the muscles painful over their whole surface or only over fixed and definite points?

Does superficial palpation of the spine prove painful? If so, have the patient bend down as far as he can in order to make it possible to determine whether the pain is on a spinous process or between two processes, i.e. on the inter-spinous ligament.

Deep palpation affords precise information on the condition of the spine itself. Are the movements of the spine (flexion, extension, bending to the right or left and rotation to the right or left) limited and painful?

Next, have the patient lie down on the examination table. Measure the length of both lower limbs and the muscles of both thighs and legs. Both lower limbs should also be checked for altered sensitivity to pricking.

Are all movements of all joints of the lower extremities normal?

Does the flexion of thighs on the trunk cause pain at any joint and is Lasègue sign positive?

Does lateral pressure on the iliac elicit pain?

Is there tenderness at the sacroiliac joint and is Goldthwait's sign positive?

Look for Valleix's points.

Is there pain in hyperextension of the thighs on the pelvis and, last, are pateller and Achilles tendon reflexes normal and even?

This is a summary, but complete, clinical examination.

A good X-ray of the lumbar spine and of the pelvis is always required. From the facts noted in the course of the examination, useful information can be given to the radiologist, who will have films taken from the necessary angles to check the accuracy of the clinical diagnosis, and will often reveal something not previously suspected.

3. THE DIAGNOSIS

The next step is to reach an accurate diagnosis through elimination.

The radiological report will provide information on:

1. recent fractures of the bony structure.
2. any anomaly such as spondylolysis with or without spondylolisthesis, lumbarization of S-1, uni– or bilateral sacralization of L-5 with or without articular facet, or narrowing of any of the joint spaces.
3. Pathological conditions, i.e. Pott's disease, spinal metastasis, old fracture, chronic hypertrophic arthritis, arthritis of the articular facets or of sacroiliac joints, Paget's disease, rheumatoid spondylitis or Marie-Strumpell's disease, etc.

From the X-ray report, it is therefore possible to rule out several possibilities and to assess the relation between a condition arising as a direct result of the accident and some antedating lesion aggravated on account of the accident.

Now, what are the possibilities in the event that radiological examination is negative?

1. Protruding disk:

This topic will be dealt with in a later issue of the Review.

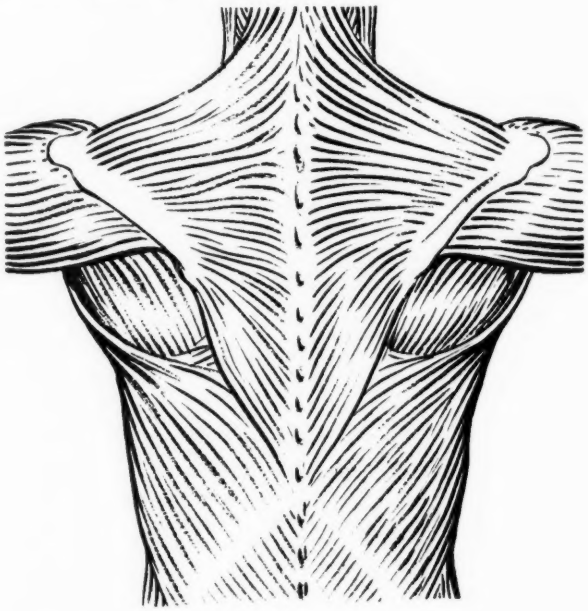
2. Back strain:

This is a muscular, aponeurotic or tendinous stress with minor, partial tears.

There is pain on palpation at the level of the involved region, contracture, pain caused by movement in that region and, sometimes, radiation to the lower limb.

As a rule, complete rest will bring about a rather quick recovery.

The diagnosis can be corroborated through a good novocaine infiltration at that level.



3. Back sprain

Back sprain is the result of an abnormal movement at the level of an articular facet, and is associated with painful muscular contracture and painful limitation of movement. Right after the accident, a severe enduring pain sets in. Coughing frequently intensifies the pain and it is most often associated with a sciatica-like radiation that may seem to indicate protusion of a disk, for the congestion arising from the stress at the joint facet level causes a slight depression at the level of the intervertebral foramen.

Complete immobilization of the spine will relieve all these symptoms and bring about a quick recovery.

4. Tear of muscles

These are most uncommon and are, as a rule, associated with deeper injuries at the level of the bony structure. In simple tears, localized pain is present together with ecchymosis and a gap in the muscle mass.

5. Sacroiliac sprains:

Sprains of this type occur frequently and are accompanied by acute pains mostly confined to the sacroiliac level, paralumbar contracture, pain on coughing or straining at stools, lack of power in the

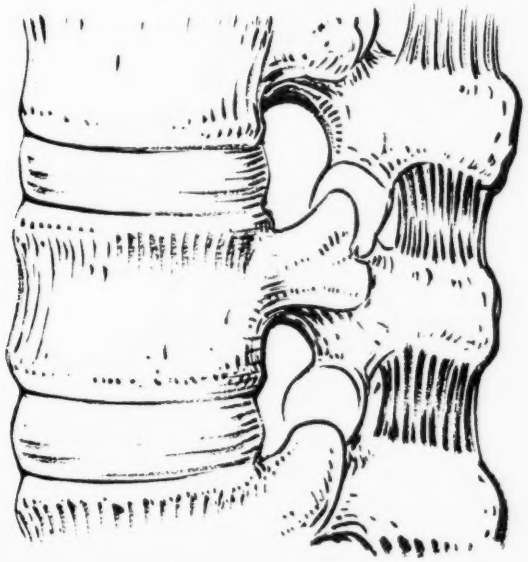
lower limbs, radiation to the sciatic, positive Lasègue sign and Valleix's points. In short, they may simulate a protruded disk, and, therefore, differential diagnosis often proves most difficult. Positive identification of sacroiliac sprains can be made by accurate location of painful areas, Goldthwait's sign, and later, pressure at the disk crests.

Good X-ray photographs of the joints must be taken to determine whether the case is one of simple sprain or of a sprain of a diseased joint affected with chronic arthritis, etc.

6. Tear or strain of the interspinous and supraspinous ligaments:

This is a rather disregarded lesion although it appears to be common enough.

The main characteristic is superficial pain over the interspinous ligament, well localized between two or several spinous processes, and chiefly elicited by forced flexion or extension of the spine, as well as by any posture inducing stress on the ligament.



As for the other symptoms, they often resemble those of a protruded disk, and that accounts for errors made during summary examinations.

It is possible to corroborate the diagnosis through a local novocaine infiltration.

These injuries are treated by repeated novocaine infiltration or excision of the ligament.

7. Rheumatoid spondylitis or Marie-Strumpell's disease

This is a most neglected pathologic spinal condition, especially in its early stages.

The condition may exist without the individual being aware of it until he suffers a slight strain at which time the pain and other symptoms will be quite out of proportion to the severity of the strain. Clinical and radiological examinations reveal protrusion of a disk and confirm diagnosis.

The chief points to be considered in differential diagnosis are:

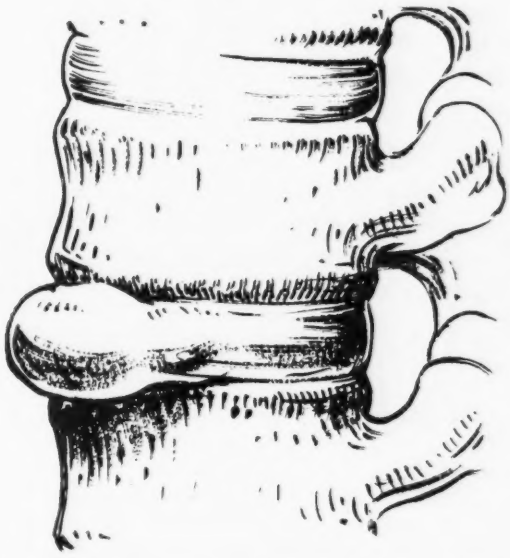
a) the disproportion between the simple trauma and the clinical manifestations;
b) any slight suspicion concerning a sacroiliac joint should draw our attention to this disease, especially when bilateral radiological signs are present;
c) painful and enduring stiffness of the spine, particularly if it is bilateral;
d) the existence of bilateral sciatica or of sciatica alternating from one side to the other;
e) slightly increased B.S.R.

The contracture improves with antispasmodics or cortisone.

At any rate, differentiation of this condition and herniated disc is difficult, the moreso as the two diseases are often associated and since one must not forget that individuals suffering from Marie-Strumpell's disease are apt to develop protruded disks on account of their diseased periarticular tissues.

Many other injuries may be encountered but they are less common.

As is obvious from this paper, diagnosis of back injuries with low back pain is not a simple matter but it is hoped that the ideas expressed will prove useful in practice and will illustrate why doctors come forth with different diagnosis in complicated cases.



Medical officers are well acquainted with treatment to be subscribed for such industries and there is no object in listing them here.

However, except in major traumas, patients should never be given to understand that their injuries are serious and complicated, for they may develop incurable sinistrosis.

CONFERENCES

International Congress on Occupational Health

The Twenty Second International Congress on Occupational Health will be held in Helsinki, Finland, July 1 to July 6, 1957.

The preliminary programme is divided into five major headings:

I Congress Subjects—dealing with the topics of Industrial Noise, Evaluation of Invalidity, Industrial Hygiene Norms, and Cardiacs at Work.

II Section Subjects—under which the following will be considered: General and Social Aspects; Occupational Pathology and Hygiene; Industrial Nursing, and Open Session Subjects, to be decided later.

III Reviews—a discussion of Psychosomatic Medicine from the Social Security aspect, Recent Advances in Industrial Ophthamology, Control of Chronic Disease in Industry, and, Recent Advances in Silicosis Research.

IV Round Table—on the topic "Teamwork in Occupational Health".

V Group Meetings—one afternoon will be reserved for group meetings at which it will be possible for university teachers; chairmen; secretaries and other officers of industrial physicians' associations; industrial nurses; medical inspectors of factories; industrial hygiene experts; social security representatives; safety engineers; persons interested in rehabilitation; medical officers and hygiene workers of the oil industry; medical officers in the textile chemical and metal industries; mine medical officers; and others, to get together. The Finnish hosts will give a luncheon at which a survey will be made of the topical questions of each sphere. There will be an excursion on July 7 to industrial establishments and hospitals in various parts of Finland.

Other highlights will include:

(a) Awarding of the Nicolò Castellino Prize—This International prize of 3,000,000 lire, will be awarded for the first time at this Congress, to the research worker who has completed the most outstanding investigation in the field of occupational health. Further details of the competition will be supplied by: Directors of Nicolò Castellino Prize, the University, Naples, Italy.

(b) Film Competition—a competition will be organized to decide on the best films on occupational health.

(c) Technical Exhibition—An international technical exhibition, with exhibits from pharmaceutical industries; manufacturers of industrial hygiene and medical apparatus and appliances; protective equipment; and publications on industrial medicine and other occupational health topics.

The Congress fee for members is $15.00 and for associate members, $10.00.

Persons wishing to present original scientific papers are invited to notify the Organizing Committee as soon as possible, stating title of paper, and including a summary of not more than 200 words in English and French. This information should reach the Committee not later than March 1, 1957.

Any other information will be supplied by the Organizing Committee, c/o Tyoterveyslai-Helsinki-Toolo, Chairman Dr. Leo Noro and Secretary-General Dr. Pentti Sumari.

Seventh International Cancer Congress

The Seventh International Cancer Congress under the sponsorship of the International Union Against Cancer, will be held in London, England, July 6-12, 1958, under the Presidency of Sir Stanford Cade. Congress headquarters will be The Royal Festival Hall.

There will be two main sessions of the Congress:

A. Experimental

B. Clinical and Cancer Control

Special emphasis will be placed on Hormones and Cancer, Chemotherapy, Carcinogenesis and Cancer of the Lung.

Proferred papers will only be considered if submitted with an accompanying abstract (not over 200 words) before October 1957 and if dealing with new and unpublished work.

The registration fee for the Congress will be £10 (10 pounds) or $30 (thirty dollars) and the latest date for registration without late fee will be *January 1, 1958.*

Registration forms and a preliminary program will be available early in 1957 on application to any one of the following:

The Secretary General
Seventh International Cancer Congress,
45 Lincoln's Inn Fields
London, W.C. 2, England.

J. H. Maisin, President,
Union Internationale Contre le Cancer,
Voer des Capucins, 61,
Louvain, Belgium.

Harold Dorn, Secretary General
Union Internationale Contre Le Cancer,
National Institute of Health,
Bethesda 14, Maryland, U.S.A.

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